(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization International Bureau



(43) International Publication Date 22 February 2001 (22.02.2001)

PCT

(10) International Publication Number WO 01/13416 A1

- (51) International Patent Classification¹: H 21/768, 23/522, 21/00, C25D 5/00
- H01L 21/288,
- (21) International Application Number: PCT/US00/40626
- (22) International Filing Date: 9 August 2000 (09.08.2000)
- (25) Filing Language:

English

(26) Publication Language:

English

- (30) Priority Data: 09/373,681
- 13 August 1999 (13.08.1999) US
- (71) Applicant: NUTOOL, INC. [US/US]; 1645 McCandless Drive, Milpitas, CA 95035 (US).
- (72) Inventors: UZOH, Cyprian, Emeks; 1645 McCandless Drive, Milpitas, CA 95035 (US). TALIEH, Homayoun; 2211 Bentley Ridge Drive, San Jose, CA 95138 (US).

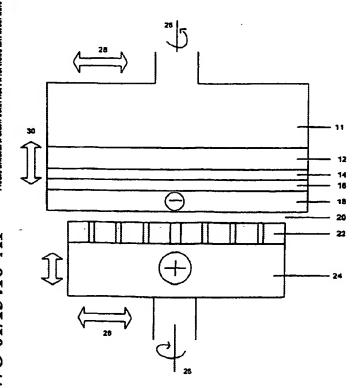
- (74) Agents: JAKOPIN, David, A. et al.; Pillsbury Madison & Sutro LLP, 1100 New York Avenue, N.W., Washington, DC 20005 (US).
- (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SO, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZA, ZW.
- (84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:

- With international search report.

[Continued on next page]

(54) Title: METHOD AND APPARATUS FOR DEPOSITING AND CONTROLLING THE TEXTURE OF A THIN FILM



(57) Abstract: The present invention provides a method and apparatus for plating a conductive material to a substrate and also modifying the physical properties of a conductive film (18b. 18c) while the substrate is being plated. The present invention further provides a method and apparatus that plates a conductive material on a workpiece surface in a "proximity" plating manner while a pad type material or other fixed feature is making contact with the workpiece surface in a "cold worked" manner. In this manner, energy stored in the cold worked regions (19b, 19c) of the plated layer is used to accelerate and enhance micro-structural recovery and growth. Thus, large grain size is obtained in the plated material at a lower annealing temperature and a shorter annealing time.

WO 01/13416 A1